



Launch of Artemis I Mission

For Prelims: UPSC, IAS, National Aeronautics and Space Administration (NASA), Artemis I, moon mission, Chandrayaan project, Indian Space Research Organisation (ISRO), History of Moon Exploration

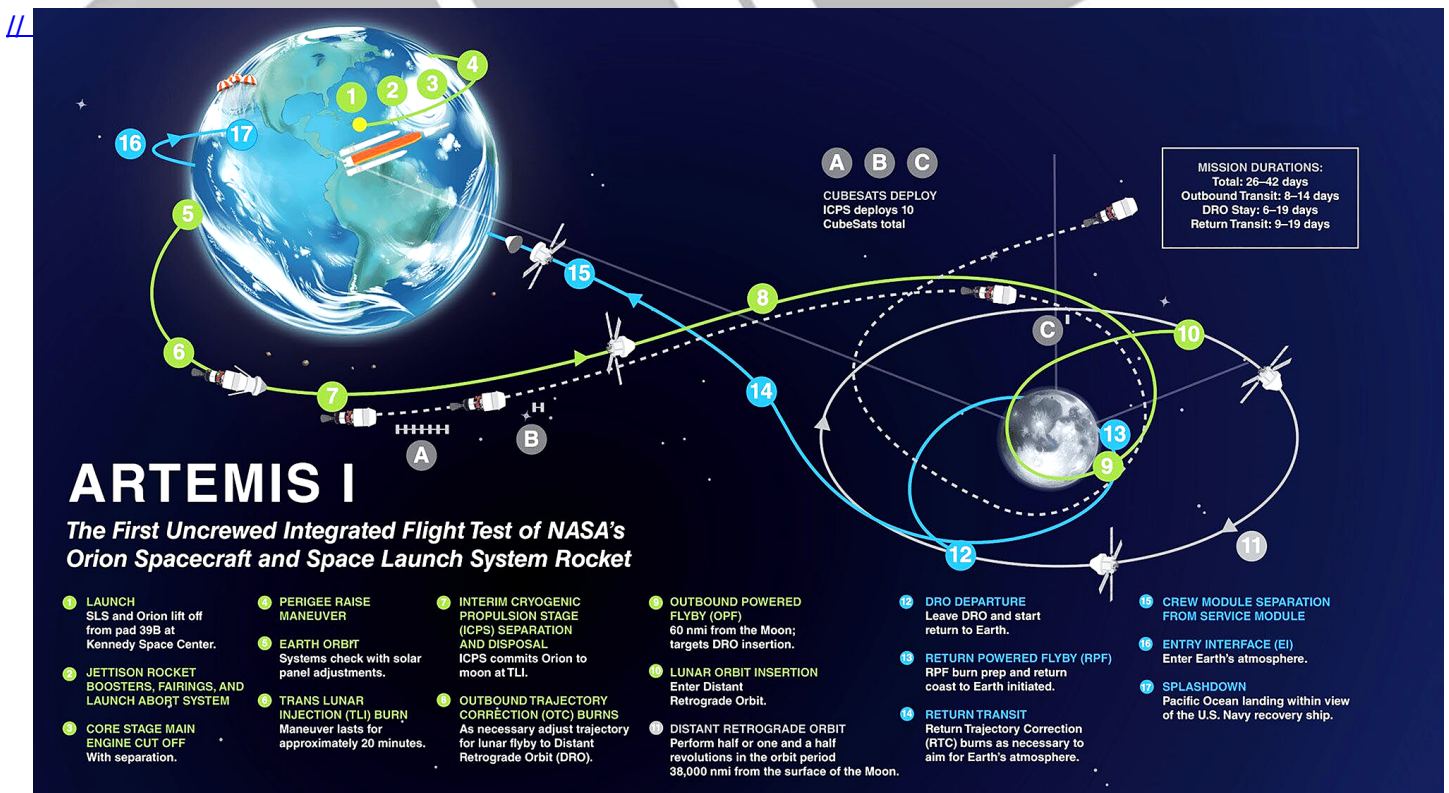
For Mains: Space Exploration, Moon mission, Sending Human on Moon and Mars.

Why in News?

[National Aeronautics and Space Administration \(NASA\)](#) is about to launch its [Artemis Program](#).

What is Artemis I Mission?

- **Artemis I** is an **uncrewed mission of NASA**.
- It will test the agency's **Space Launch System (SLS) rocket and Orion crew capsule**.
- Artemis I will be the **first in a series of increasingly complex missions to build a long-term human presence at the Moon for decades to come**.
 - The primary goals for Artemis I are to **demonstrate Orion's systems in a spaceflight environment and ensure a safe re-entry, descent, splashdown, and recovery** prior to the first flight with crew on Artemis II.



What will be the Key Events During the Mission?

- **Artemis I launch**
 - The SLS rocket and Orion spacecraft have **completed their journey from their assembly building to Launch Complex 39B** at the **Kennedy Space Centre in Florida**.
 - At launch, the rocket will produce a maximum of more than **3.9 million kilograms of thrust** from its **four RS-25 engines and five-segment boosters**.
 - Shortly after launch, the **boosters, service module and launch abort systems** will be offloaded.
 - Then, the **core stage engines will be shut down** and the **core stage will separate from the spacecraft**.
- **Artemis I: Trajectory to the moon**
 - After launch, the **spacecraft will orbit the Earth and deploy its solar arrays**.
 - Next, the **Interim Cryogenic Propulsion Stage (ICPS) will give Orion a “push” to help it leave Earth’s orbit** and travel toward the planet’s only natural satellite.
 - Then, within about two hours from launch time, when **the spacecraft is on a trajectory to the Moon, it will separate from ICPS**.
 - When it separates from the spacecraft, ICPS will **deploy small satellites, known as [CubeSats](#)** to send them on their journey to deep space.
 - This includes **BioSentinel**, which will **carry yeast into deep space** to study the **effects of deep space radiation on living matter**.
 - The other CubeSats will also perform many science and technology demonstrations.
- **Artemis I: Moon orbit**
 - On its path to the Moon, **Orion will be propelled by a service module** built by the **European Space Agency**.
 - Apart from supplying the spacecraft’s propulsion system and power, the service module is also designed to house air and water for future crewed missions.
 - Once it enters the **Moon’s orbit**, the spacecraft will **collect data**.
 - Afterwards, Orion will **use a precisely timed engine firing of the service module in combination with the Moon’s gravity to accelerate back towards our planet**.
- **Artemis I: Reentry into Earth’s atmosphere**
 - After a total **mission time of around 6 weeks**, **Orion will enter Earth’s atmosphere**.
 - And if all goes as planned, **it will land in the sea, within eyesight of a recovery ship** stationed off the coast of **Baja in California**.

What is the History of Moon Exploration?

- In 1959, the **Soviet Union’s uncrewed Luna 1 and 2** became the first rovers to visit the Moon.
- The US began trying to put people in space as early as **1961**.
- Eight years later, on 20th July, 1969, **Neil Armstrong along with Edwin “Buzz” Aldrin became the first human to step on the Moon** as part of the Apollo 11 mission.
 - Before the USA sent the **Apollo 11 mission to the Moon**, it sent three classes of robotic missions between **1961 and 1968**.
- After July 1969, **12 American astronauts walked on the surface of the Moon until 1972**.
- In the 1990s, the USA resumed **lunar exploration with robotic missions Clementine and Lunar Prospector**.
- In 2009, it began a new series of robotic lunar missions with the launch of the **Lunar Reconnaissance Orbiter (LRO) and the Lunar Crater Observation and Sensing Satellite (LCROSS)**.
- In 2011, NASA began the ARTEMIS.
- In 2012, the **Gravity Recovery and Interior Laboratory (GRAIL)** spacecraft studied the Moon’s gravity.
- Apart from the USA, the European Space Agency, Japan, China, and India have sent missions to explore the Moon.
- China landed two rovers on the surface, which includes the **first-ever landing on the Moon’s far side in 2019**.

What are ISRO's Moon Exploration Efforts?

- **Chandrayaan 1:**
 - The [Chandrayaan project](#) began in 2007 with an agreement between **India's space agency ISRO and Russia's ROSCOSMOS for mutual cooperation.**
 - However, the mission was postponed in January 2013 and rescheduled to 2016 as Russia was unable to develop the lander on time.
 - **Findings:** Confirmed presence of lunar water.
 - Evidence of lunar caves formed by an ancient lunar lava flow.
 - Past tectonic activity was found on the lunar surface.
 - The faults and fractures discovered could be features of past interior **tectonic activity** coupled with **meteorite** impacts.
- **Chandrayaan-2** is India's second mission to the moon and comprises a **fully indigenous Orbiter, Lander (Vikram) and Rover (Pragyan).**
 - The Rover Pragyan is housed inside **Vikram lander.**
- The [Indian Space Research Organisation \(ISRO\)](#) recently announced India's third lunar mission [Chandrayaan-3](#), which will comprise a lander and a rover.

UPSC Civil Services Examination, Previous Year Question

Q. Which of the following pairs is/are correctly matched? (2014)

	Spacecraft	Purpose
1.	Cassini-Huygens	Orbiting the Venus and transmitting data to the Earth
2.	Messenger	Mapping and investigating the Mercury
3.	Voyager 1 and 2	Exploring the outer solar system

Select the correct answer using the code given below:

- (a) 1 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

Ans: (b)

- Cassini-Huygens was sent to study Saturn and its moons. It was a joint collaboration between NASA and European Space Agency. It was launched in 1997 and entered Saturn's orbit in 2004. The mission ended in 2017. Hence, pair 1 is not correctly matched.
- Messenger, a spacecraft by NASA was sent to map and investigate Mercury. It was launched in 2004 and entered Mercury's orbit in 2011. The mission ended in 2015. Hence, pair 2 is correctly matched.
- Voyager 1 and 2 were launched by NASA in 1977 to explore the outer solar system. Both the spacecrafts are still operational. Hence, pair 3 is correctly matched.
- **Therefore, option (b) is the correct answer.**

[Source: IE](#)

